Changes in Global Energy Markets and their Effects on Colorado's Economy

Presented at:

Annual Demography Meeting
November 18, 2005
State Demography Office
Colorado Department of Local Affairs

Dr. Robert Sonora
Assistant Professor of Economics
Office of Economic Analysis and Business Research
School of Business Administration
Fort Lewis College
Durango, CO 81301

Introduction

1. Colorado, US, and World
2. Relationship between Natural Gas and Petroleum Prices
3. Sources of price changes: supply and demand
4. Forecasts of Energy Prices
5. Natural Gas and Oil Extraction Labor Markets

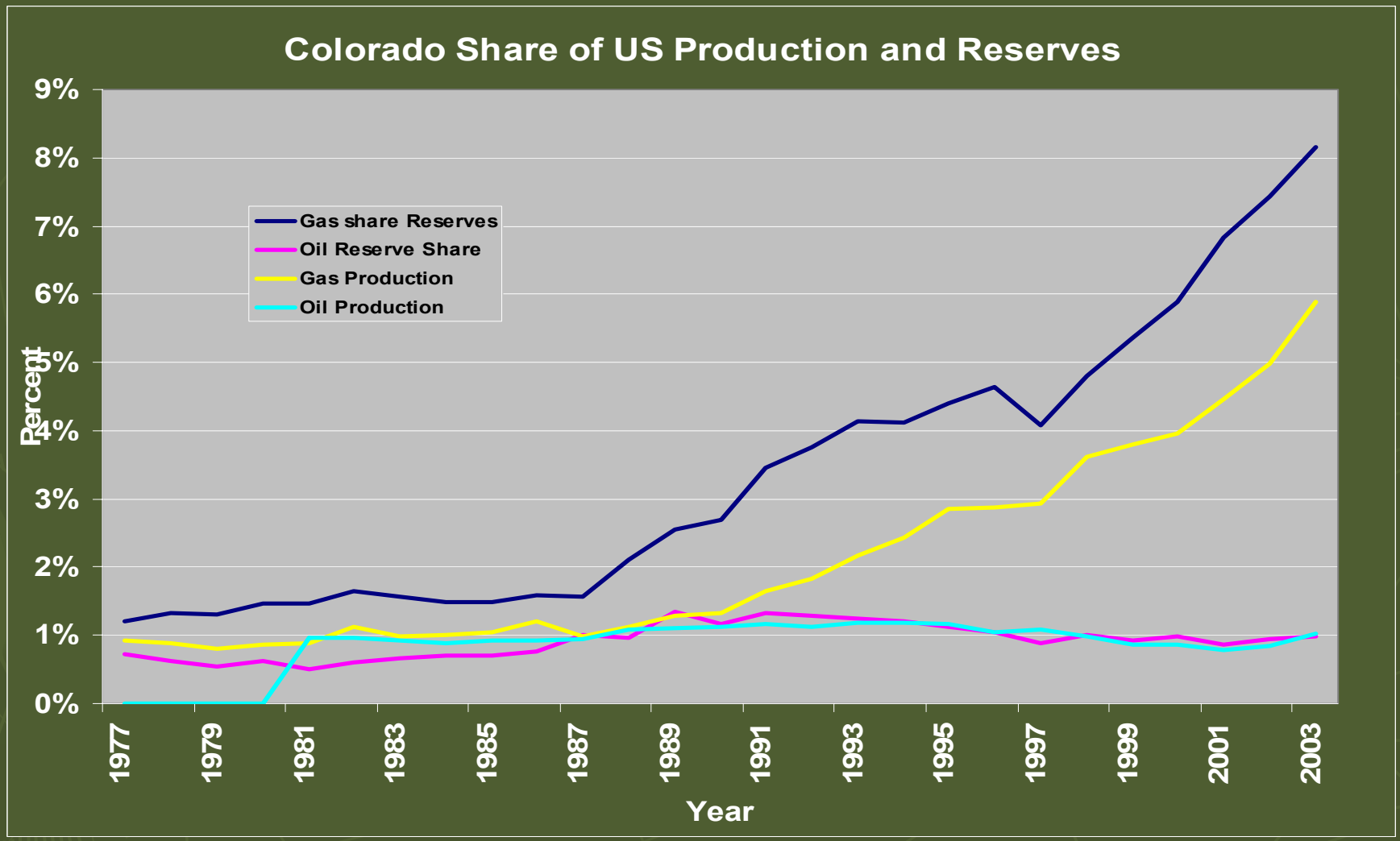
Energy: Colorado

- Energy is an essential part of the Colorado economy – tug-of-war
  - Demand side: high energy prices may slow economic activity
  - Supply side: high energy prices pump in more revenues which assists economic growth and local coffers

Energy

- Colorado:
  - Natural Gas (2003):
    - Reserves: 4th largest (NM, TX, WY)
    - Production: 6th largest (NM, OK, TX, WY, LA)
  - Petroleum (2003):
    - Reserves: 14/56 (includes offshore)
    - Production: 18/45

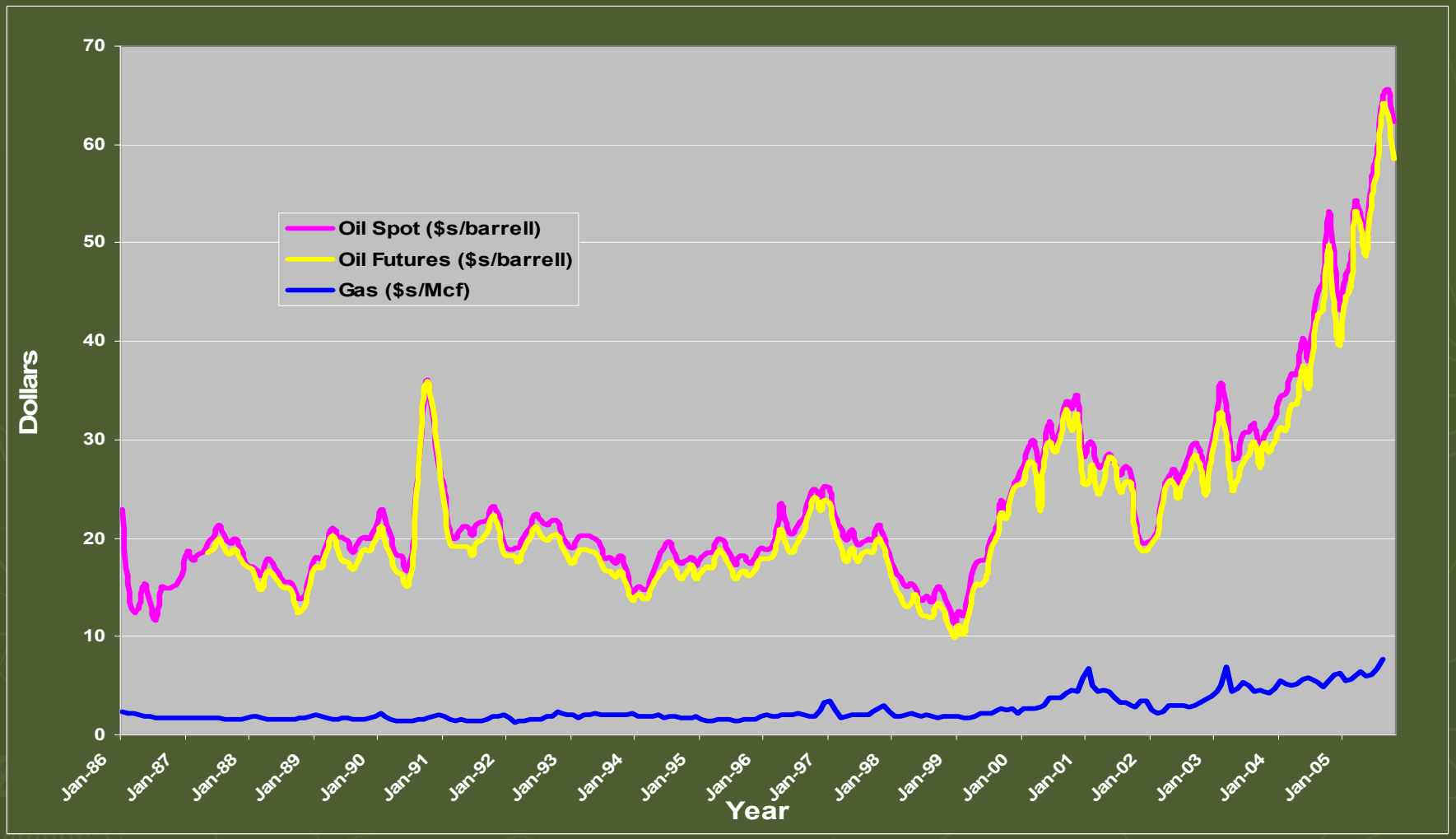
Energy



Source: US Department of Energy

Energy

Gas and Oil Prices: 1986-2005



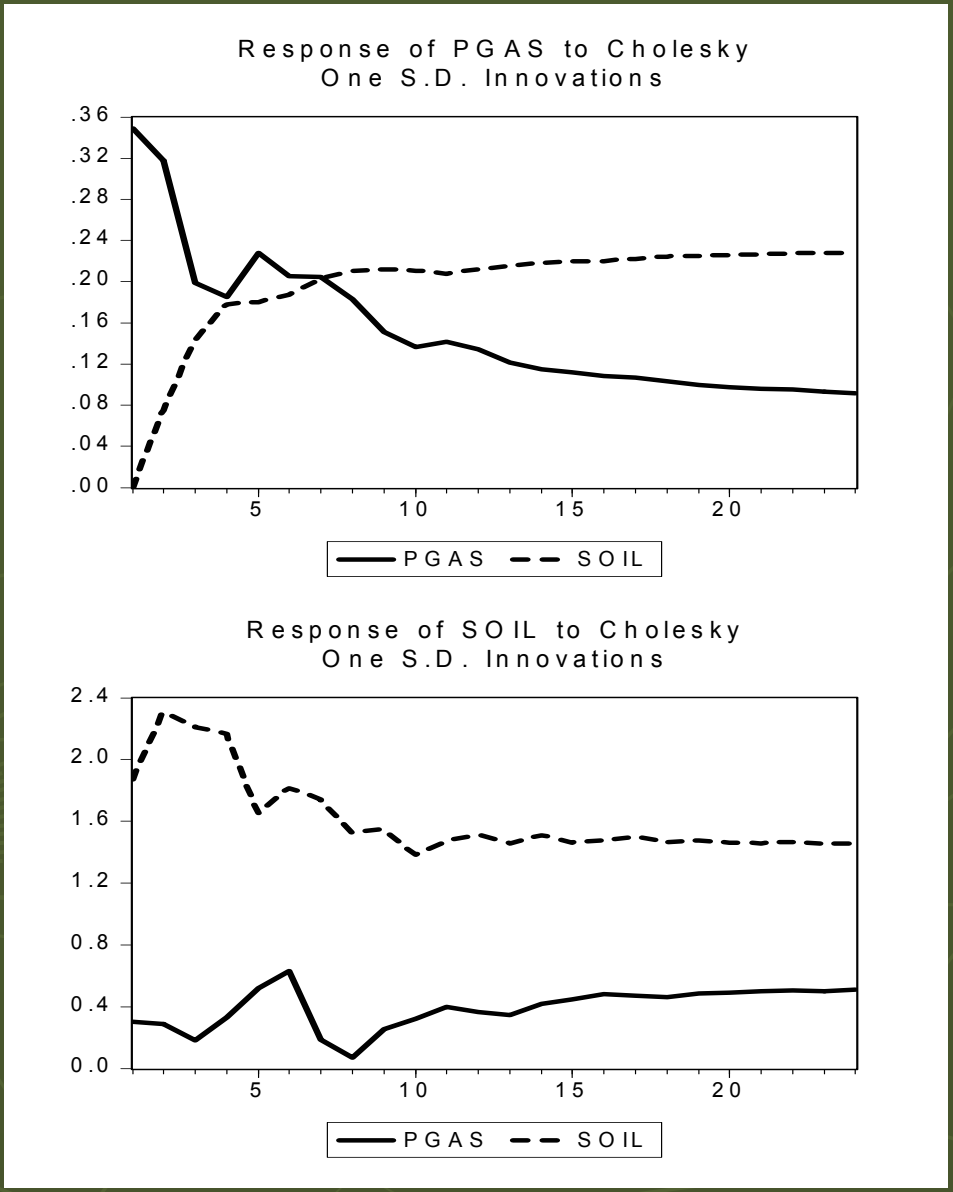
Source: US Department of Energy

Energy: World Market/Prices

- Prices
  - Natural Gas and Petroleum Prices are very highly correlated: Substitution effects
  - Contemporaneous Price effects

	Spot Oil Prices	Future Oil Prices	Natural Gas Prices
Spot Oil Prices	1.000		
Future Oil Prices	0.996	1.000	
Natural Gas Prices	0.856	0.834	1.000

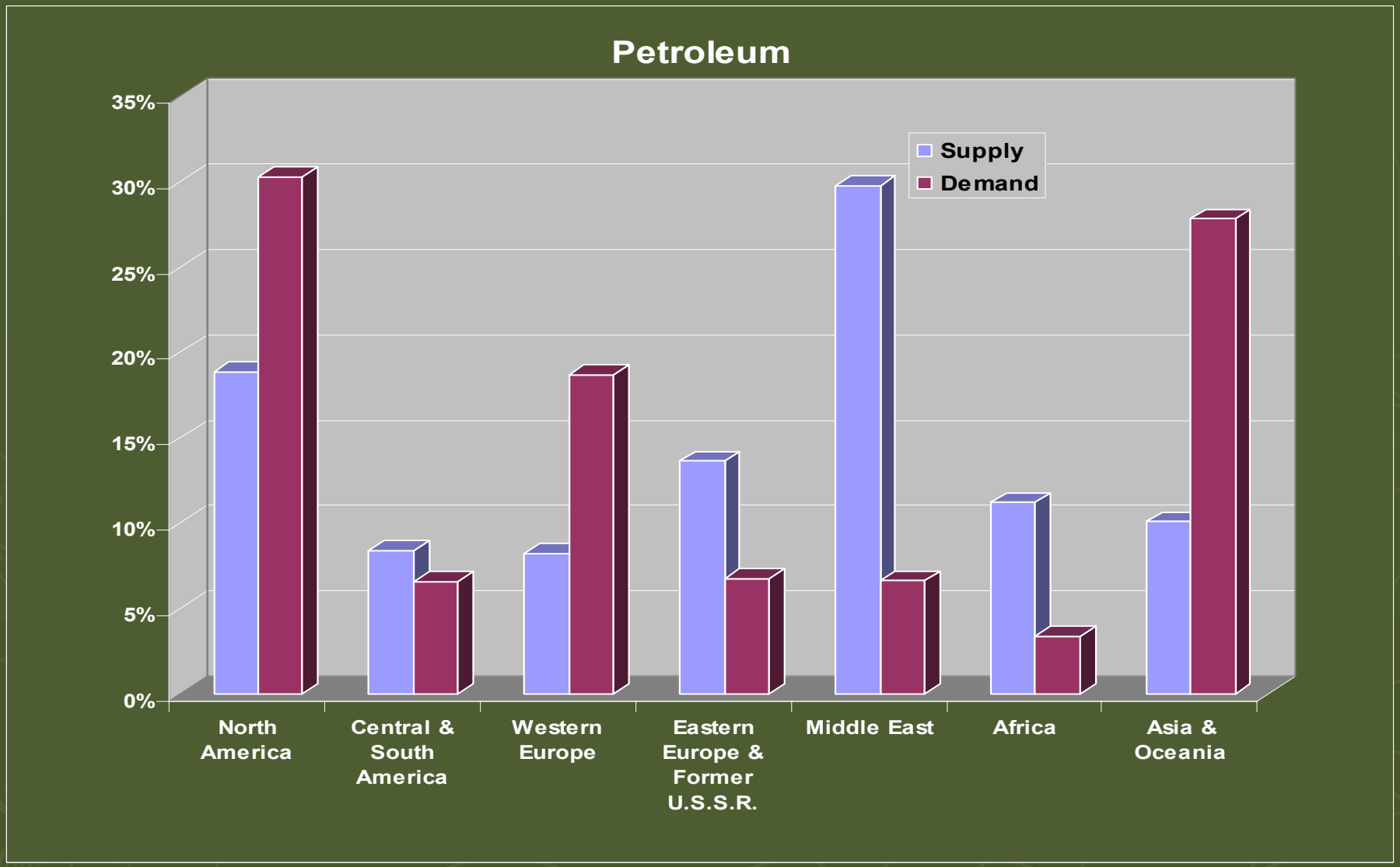
Price responses to sector specific shocks: 1986-2005



Energy

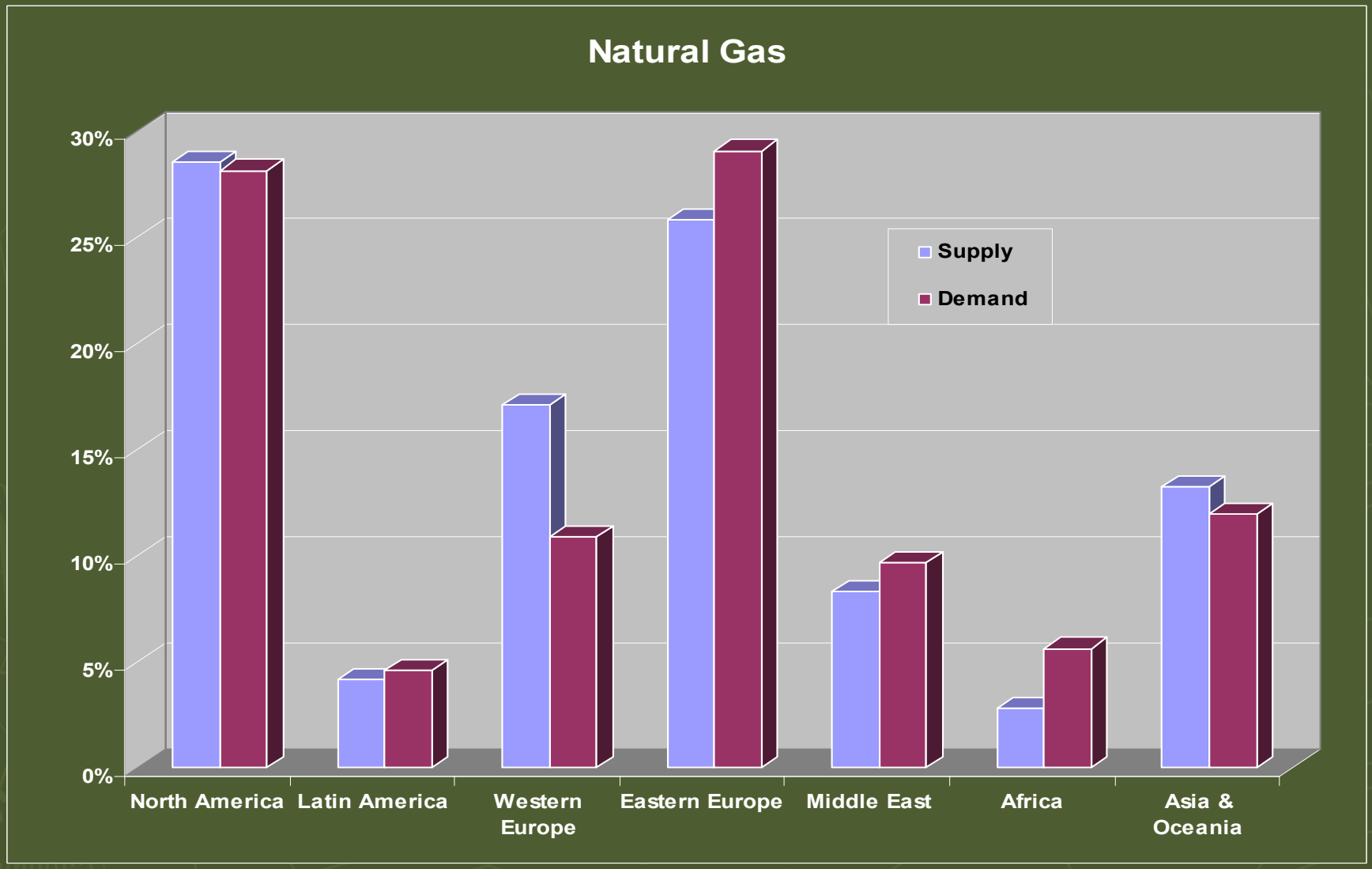
- Price pressures after January, 2000
- Demand
  - China, Japan, US, Eastern & Western Europe, Russia
- Supply
  - Uncertainty, 9/11, Terrorism, Afghanistan, Iraq, Iran, Venezuela, Natural Disasters, Russia

Petroleum supply and demand: 2003



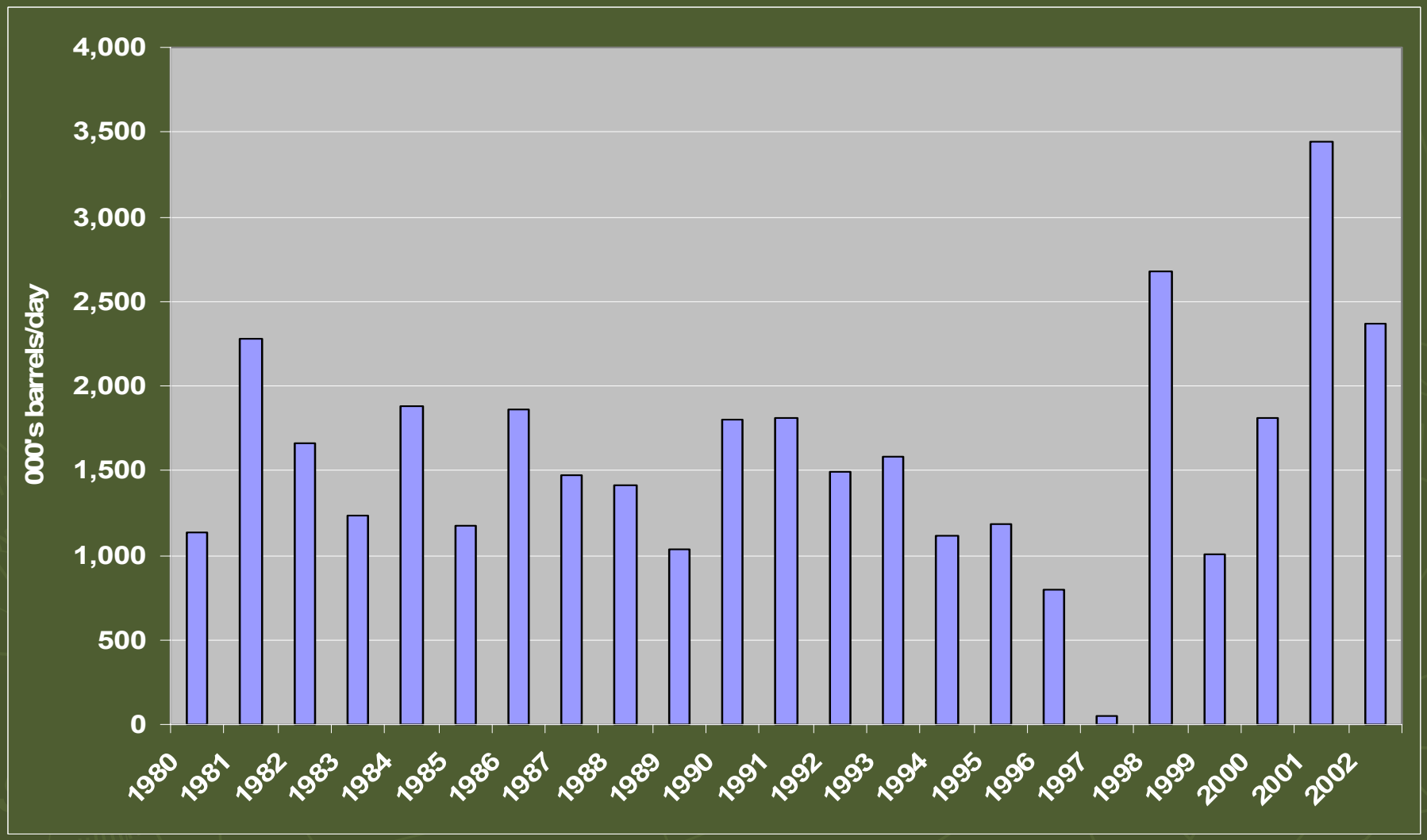
Source: US Department of Energy

Natural gas supply and demand: 2003



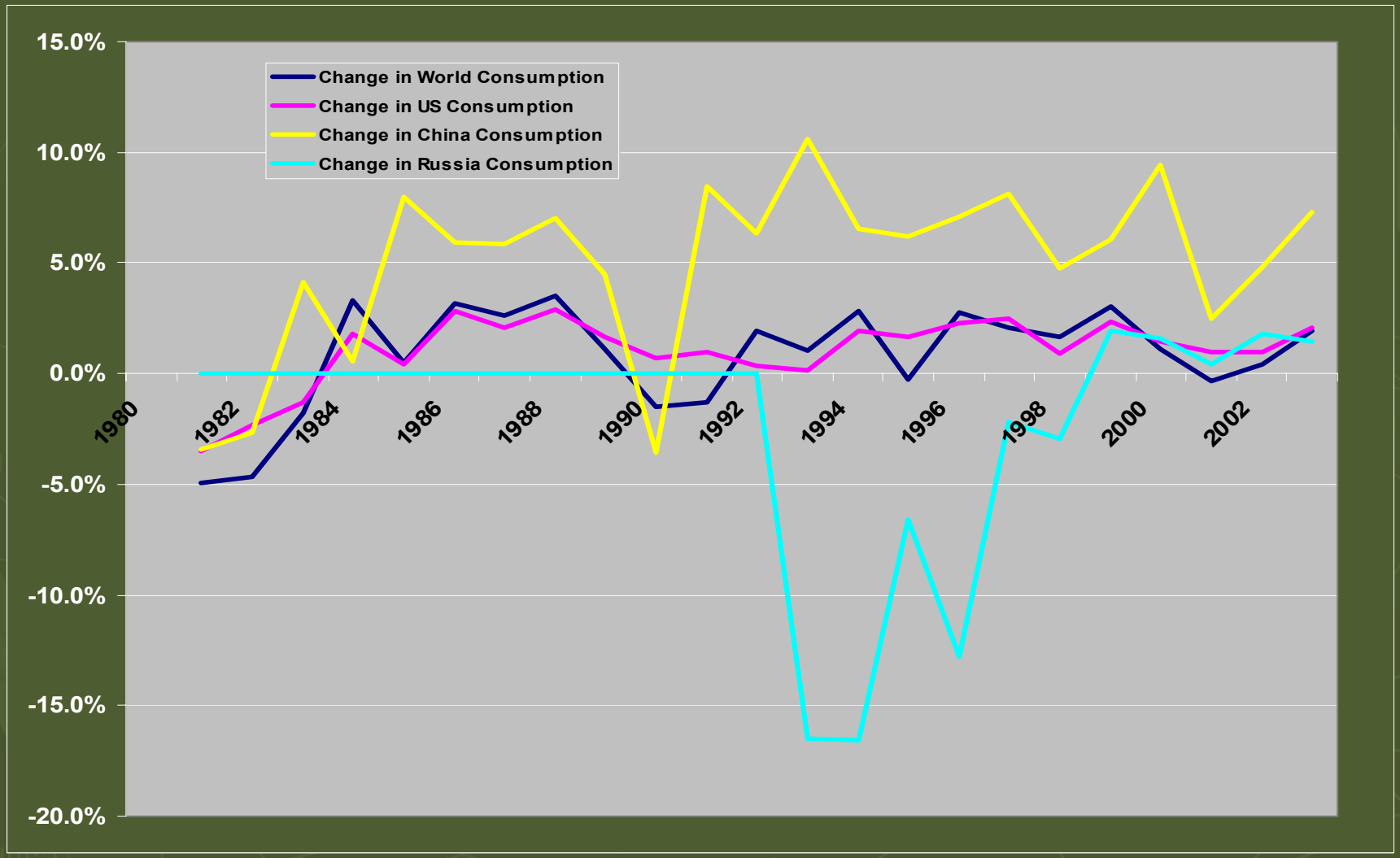
Source: US Department of Energy

Global Excess Consumption of Petroleum



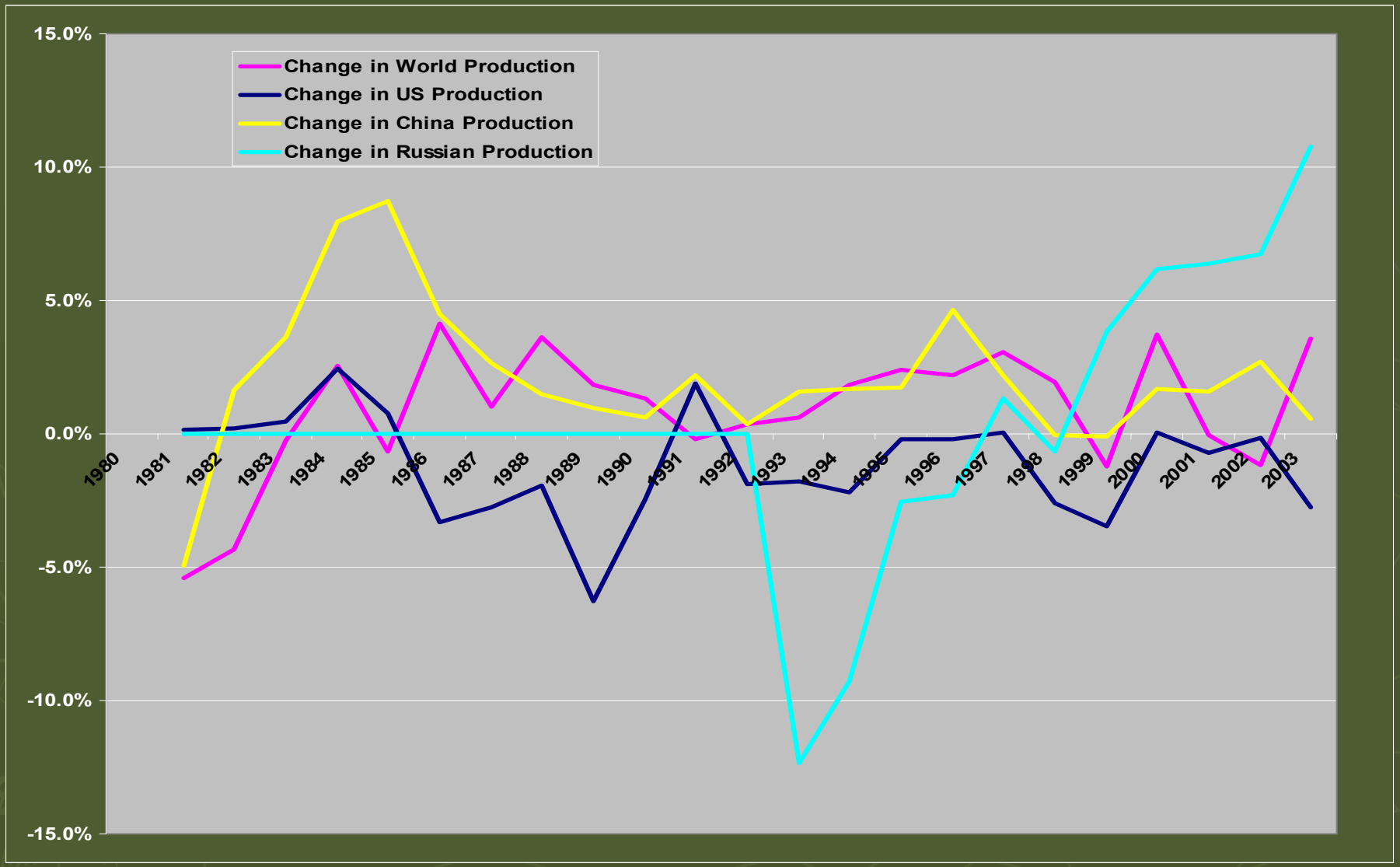
Source: US Department of Energy

World, US, China, and Russia Petroleum Consumption



Source: US Department of Energy

World, US, China, and Russia Petroleum Production

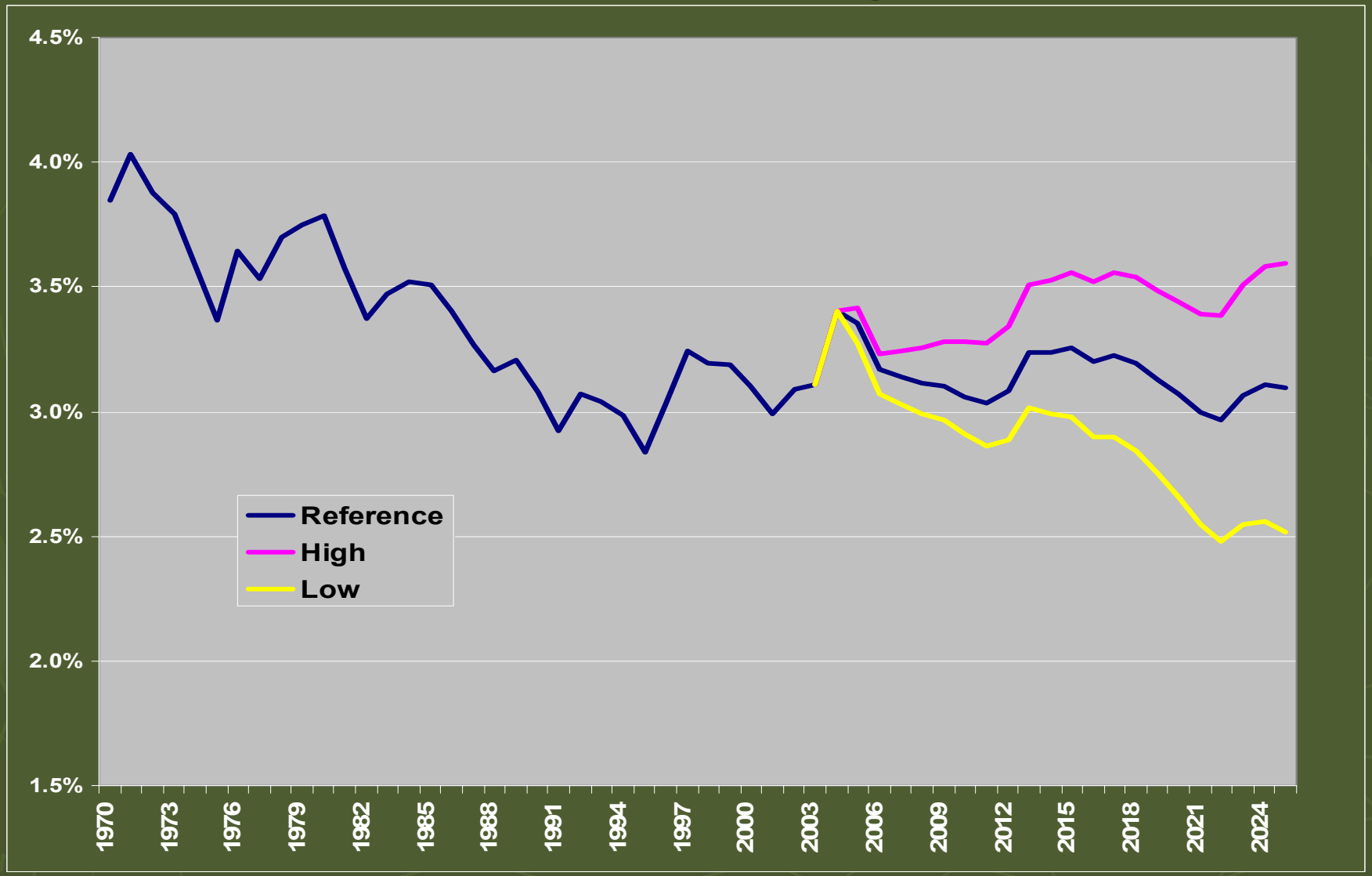


Source: US Department of Energy

Energy Forecasts

- Incomes rising, particularly in developing countries, oil and gas prices will rise …
- But depends on projection
- US Real GDP Growth (Demand)
  - In the reference case: investment growth = 5.1%
  - In the high growth case: investment growth = 5.8 %
  - In the low growth case: investment growth = 4.0 %

GDP Growth Projection



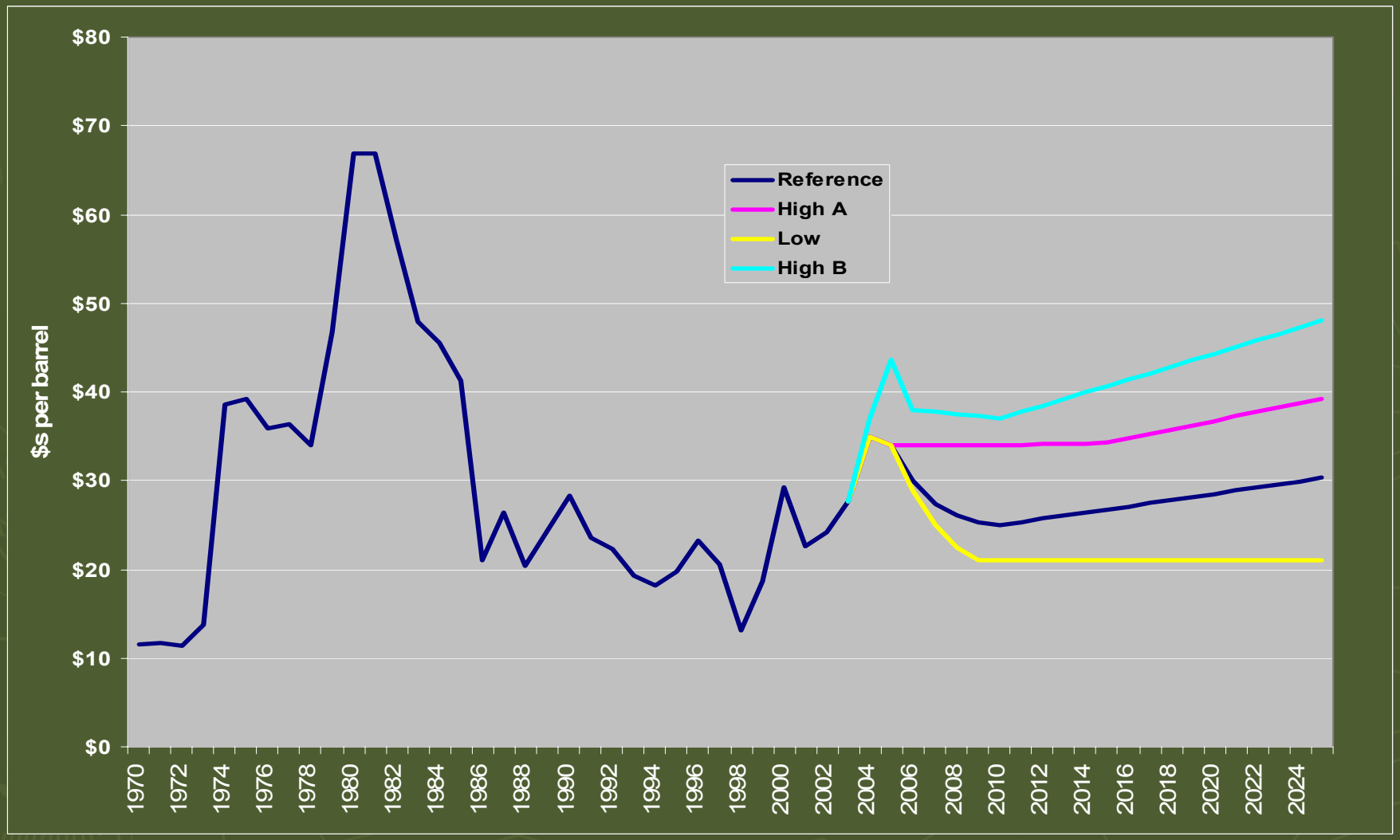
Source: US Department of Energy

Petroleum Projections

- Oil Prices
  - Depends on assumptions
    - Reference case, with both OPEC and non-OPEC producers scheduled to add new production capacity over the next 5 years
    - Low price case
    - The high A price
    - The high B case

Energy Forecasts: 1970-2025

Oil Price Projections



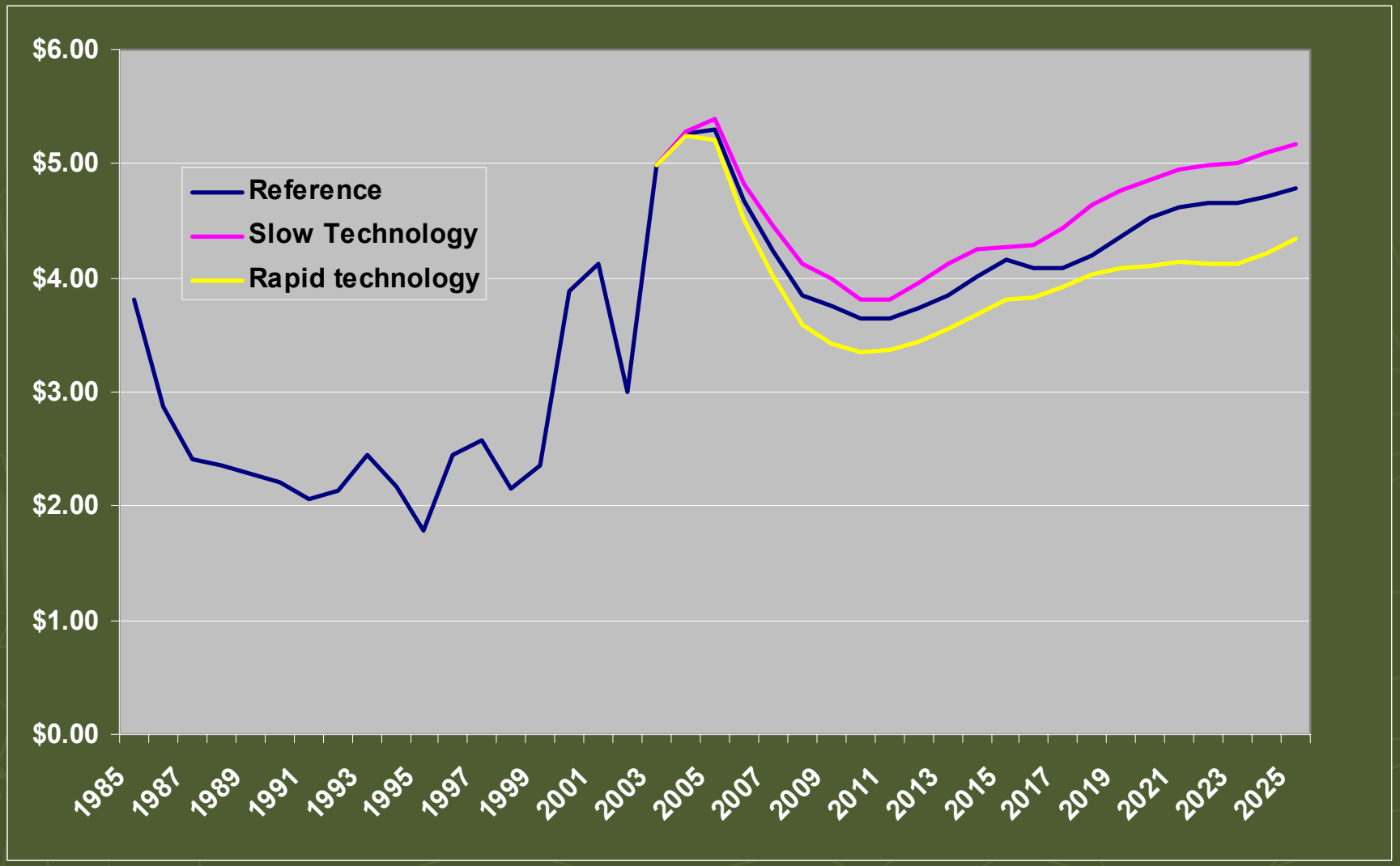
Source: US Department of Energy

Natural Gas Projections

- Natural gas prices in lower 48
  - Depends on state of technology
    - Benchmark/Reference
    - Rapid Technology: lower prices
    - Slow Technology: higher prices

Energy Projections: 1985-2025

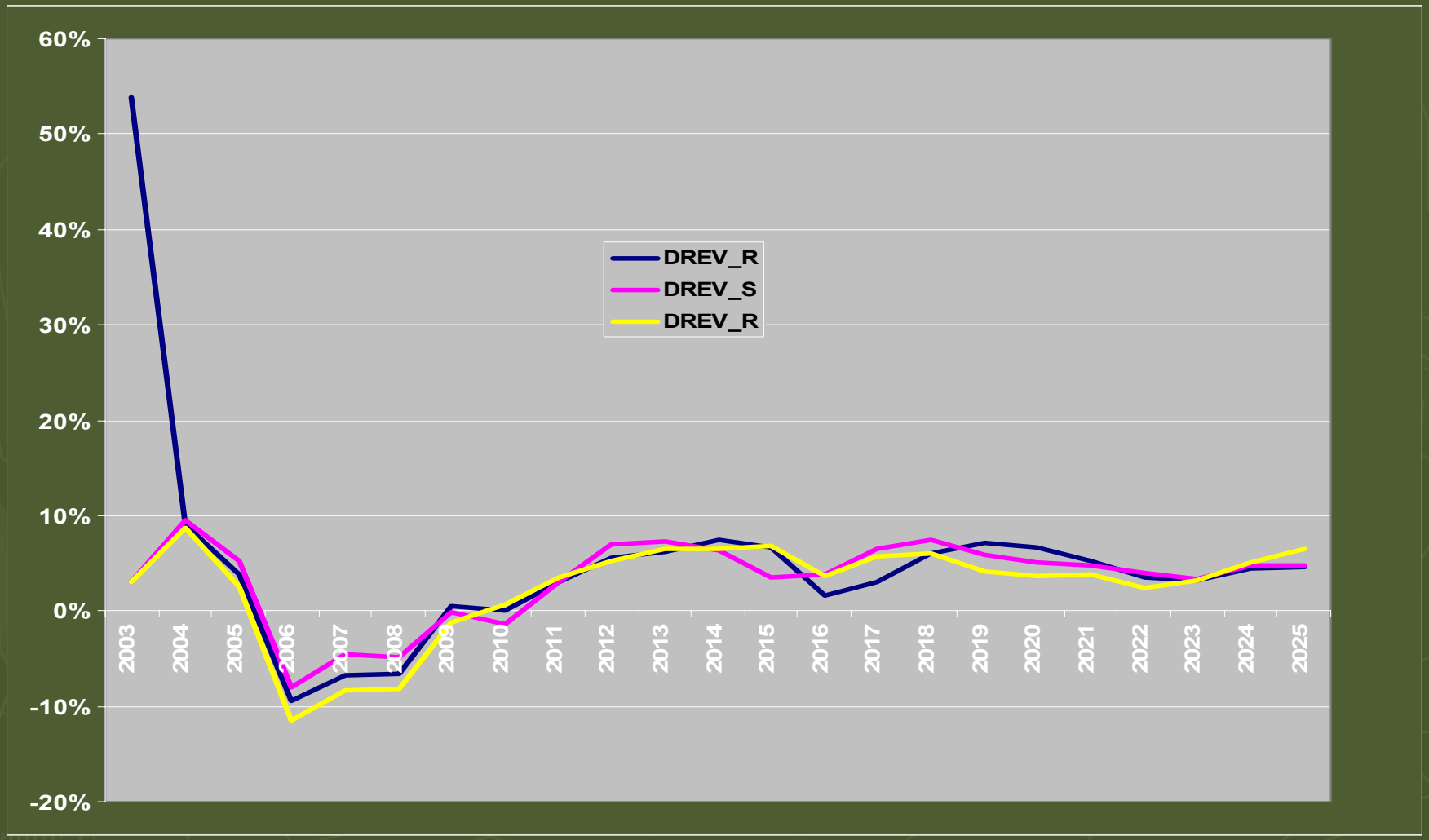
Natural Gas Price Projections



Source: US Department of Energy

Energy Projections: 1985-2025

Revenue Growth from Natural Gas Price Projections



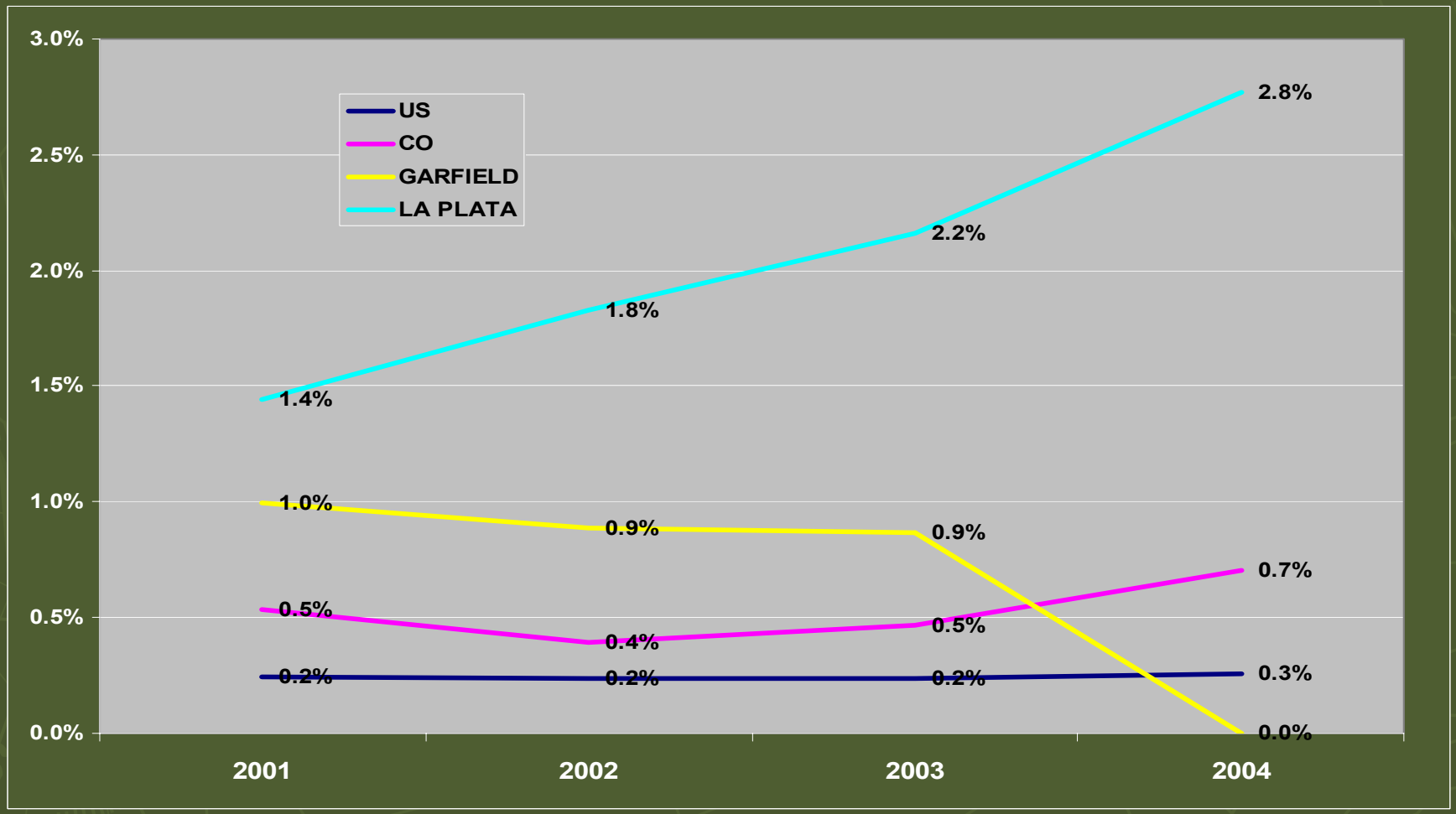
Source: Author's calculations using DOE data.

Extraction and Labor Markets

- Extraction, increasing employment?
- What is the
- Effects on local economy
  - Wages rising in extraction, due to
    - Price changes
    - Global labor competition

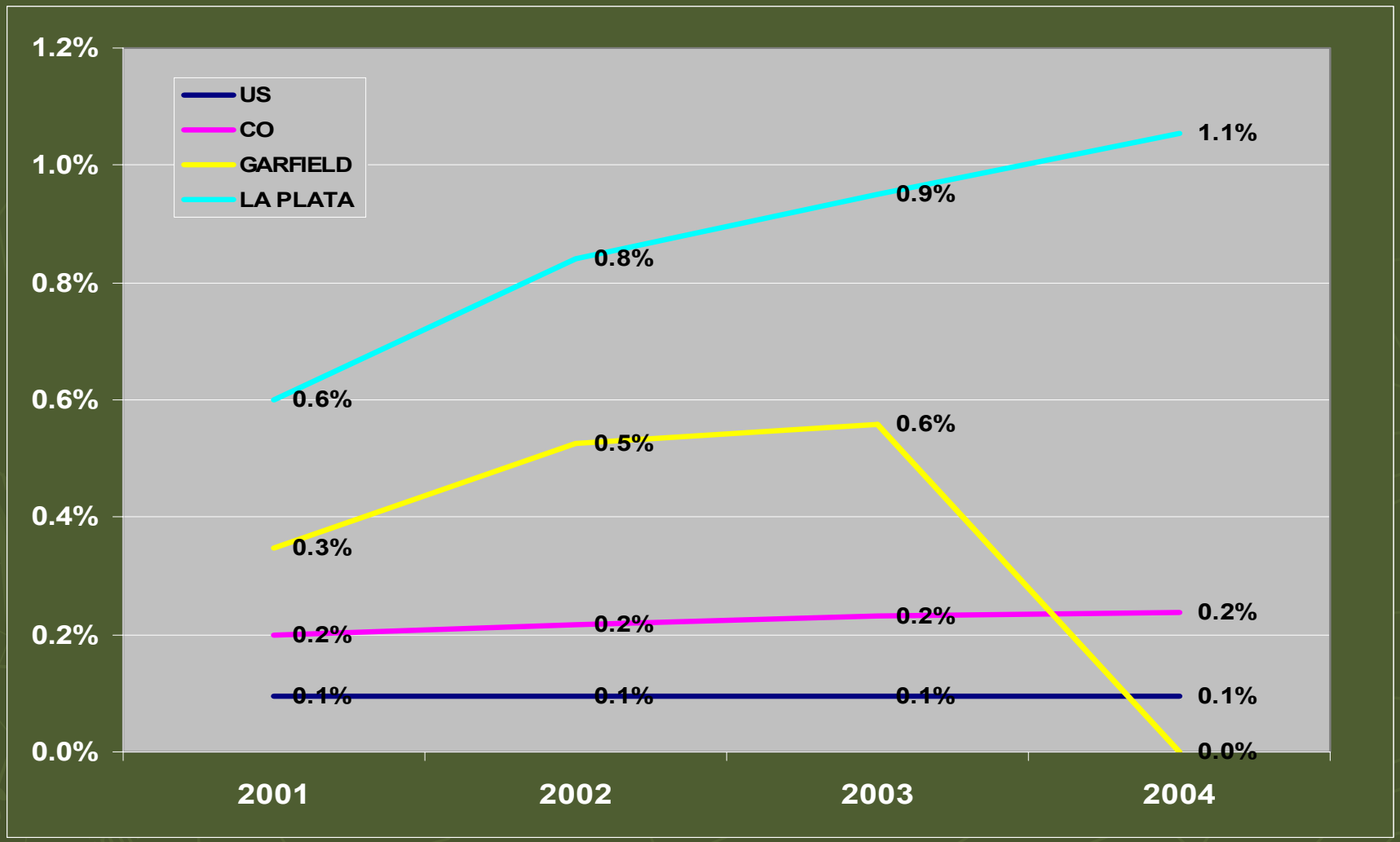
3. Labor Markets

- Oil and Natural Extraction: Income Share



Source: Author's calculations using BLS data.

Oil and Natural Extraction: Employment Share



Source: Author's calculations using BLS data.

Labor Market

- But these numbers only tell part of the picture
  - Industry has down/up- stream links ⇒ *multiplier effects*
  - **SW** Colorado multipliers (BEA), 2004:
    - **The Output Multiplier: 1.43**
    - **The Earnings Multiplier: 1.84**
    - **The Employment Multiplier: 3.04**

Effects on La Plata County

Category	Assuming 50% of Discretionary Income Spent in La Plata County	Assuming 100% of Discretionary Income Spent in La Plata County
Non-Capital Expenditures by Primary Natural Gas Producers in La Plata County (excluding payroll)	$173 million	$173 million
Natural Gas employee expenditures in La Plata County (assuming 50%/100% of disposable payroll was spent in La Plata County)	$8.9 million	$17.8 million
Local royalty expenditures (assuming that 50%/100% of the royalty payments made to recipients was spent in La Plata County)	$33.8 million	$67.6 million
Direct and Induced Economic Impact	$215.7 million	$258.4 million
Multiplier	1.43	1.43
Total Estimated Economic Impact	$308.4 million	$369.5 million
Total Existing Natural Gas Jobs in the County	305	305
Jobs Attributable to the Natural Gas Industry	623	623
Total Job Opportunities Created by Natural Gas	928	928

Labor Market

- Some caveats to consider
  - Multipliers differ across regions: La Plata is close to NM, UT, AZ $\Rightarrow$ job "exports"
  - Shares represent only those jobs identified as Gas and Oil Extraction, but other sectors do work for O & G (multipliers)
  - Effects differ across sizes of economies, larger spillover effects in larger economies
  - Effects on housing? O & G have, generally, higher incomes so could push up housing prices, but small share.

Summary

Further Questions?

Thank You